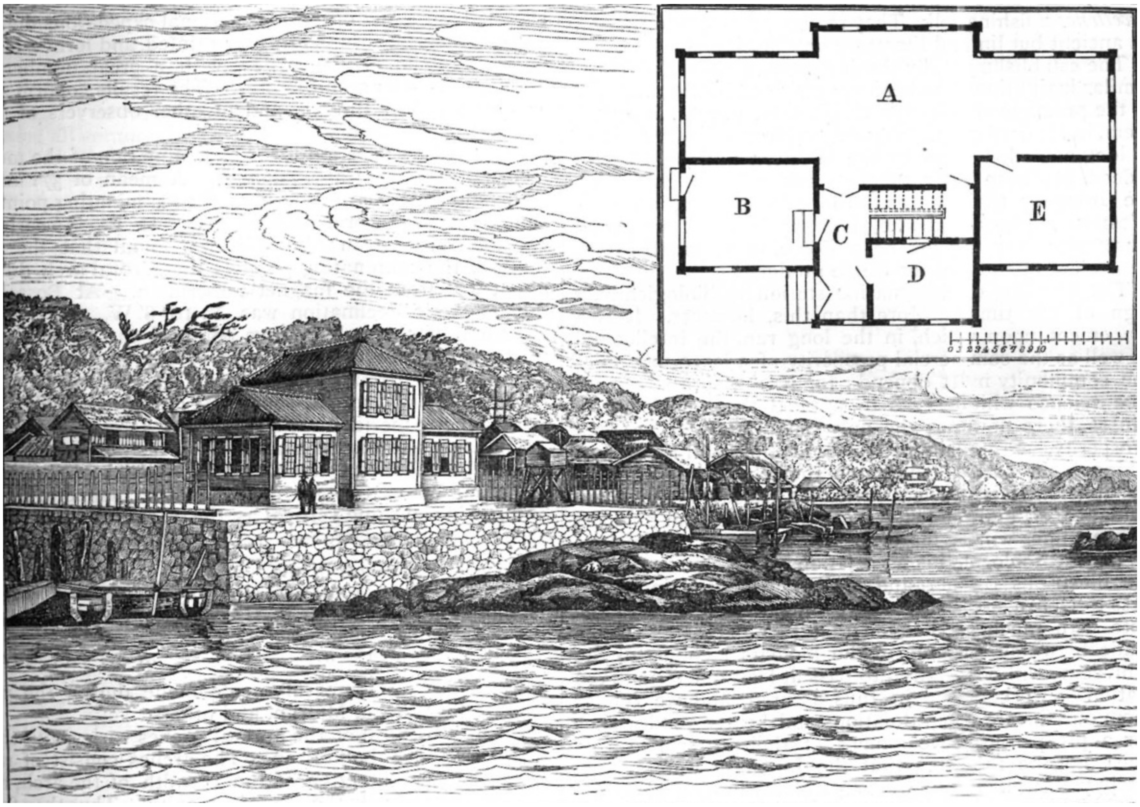
NATURAL SCIENCE IN JAPAN.

WITH the close of our eventful Jubilee year there was completed the first volume of a new journal of science which is destined to play a very important part in the advance of knowledge. We refer to the Journal of the College of Science of the Imperial University of Japan, already noted in these pages.

This periodical is issued under the joint editorship of four professors in the College whence it originated. These gentlemen, one only of whom is an Englishman, constitute a publishing committee: they have adopted the wise plan of issuing all communications on all subjects recognized within the one cover, and under their supervision there have already appeared a series of original papers of considerable interest, so far at least as those biological are concerned. The work is being well done: authors, editors, publishers, and craftsmen appear to be working harmoniously in the production of a journal which, while it reflects the utmost credit on all, leaves nothing to be desired. Twenty-one original monographs have been set up, three of them in German, the rest in English. Of these five are biological, while six are devoted to physics, four to chemistry, three to seismology, and two to geology proper. It is to the first-named that we wish now to refer. The first paper published deals with the life-history of a parasite (*Ugimya sericaria*) which works fearful havoc among the silkworms in Japan: this monograph is in itself interesting, apart from its intrinsic merit, as showing that our Eastern friends are fully alive to the so-called practical application of their work. This and other valuable papers which we might name testify most satisfactorily to the thoroughness of, at any rate, one side of the undertaking; others there are which show that these investigators are fully prepared to face some of the most formidable problems now exercising the mind of the zoologist, and in dealing with such problems they display a diligent attention and cautious generalization, such as are occasionally looked for in vain in writings nearer home. If this excellent beginning is, in these respects, indicative of that which is to follow, only results of the greatest value can ensue.



The Marine Biological Station of the Imperial University at Misaki.

Of the zoological communications two are exceptional—we refer to those contributed by Prof. K. Mitsukuri, of the Imperial University, Tokio. One of these, on the germinal layers in Chelonia (produced in conjunction with his assistant, Ishikawa), has previously appeared in our own *Journal of Microscopical Science.* The other is deserving of especial comment, for it brings tidings of the establishment of a marine biological station of the Imperial University, at Misaki.

Misaki is a fishing settlement to the west of the Bay of Tokio, easily accessible, we are told, from Tokio or Yokohama in a day. Its waters have a direct interest for Western zoologists, in the fact that they have given birth to most of those museum specimens of Hyalonema, with which the skilful Japanese so long duped the rest of the world. Geographically, the relations of Japan to Asia may be appropriately compared with those of Britain to Europe: in their greater climatic variations, however, the Easterns have an advantage, if only by way of variety in the fauna and flora thereby induced. Again, Misaki, says Prof. Mitsukuri, has "long been a favourite collecting ground for naturalists; almost every group of animals is represented in this region in more or less abundance," and he gives it as his opinion that zoologists have by no means "become acquainted with even a small part of all the interesting animals to be found." When we reflect

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upon this, mindful of the climatic features of the district, and in view of the enumeration given of known inhabitants of its waters, great expectations are conjured up, and the importance of the enterprise upon which our friends have embarked becomes self-evident.

The station has been founded by the Department of Education and the authorities of the Imperial University, as a special adjunct to the biological laboratories of the latter. As it is fair to assume that the governmental body will, like all others, expect "something practical" for its money, we anticipate that attention will early be given to questions of economic importance. The Japanese have a fishing population of more than 1,500,000 active workers, while it is computed that 36,000,000 persons, in all, are more or less dependent upon fish as food. When, in view of the total area and population of our own islands as compared with those of Japan, it is remembered that our own fishing population numbers little over 540,000, it becomes needless to point out that the Japanese are *par excellence* a fishing folk. They moreover appear to possess an ancient but limited literature on the subject.

The establishment, by the Japanese, of this and other similar institutions has been necessitated by the adoption of the products of Western civilization, almost, it would seem, in return for that "devout and learned admiration" so long accorded them by the Western nations. Rapid indeed has been their progress under influences which are bringing their wares into open competition with Western markets, and who shall say but that we proud Europeans may not yet be, perforce, to no small extent dependent upon them for edible produce?

The founding of this marine station is, biologically, a sign of the times. More than this, however. It is a movement upon which, in the long run, the intellectual as well as the commercial prosperity of a large section of the community must depend; for in the spread of that true science which seeks to unravel the knowledge of causes, there now lies the only sound basis for national prosperity. Prof. Mitsukuri's association with the undertaking is, in itself, a guarantee that these interests will be upheld. His earlier work was executed under the guidance of, and in fellowship with, American subjects whose names will be for ever memorable in the history of marine zoology: his association with them and with the illustrious Balfour, and his acknowledged indebtedness to Dohrn, are, in themselves, auguries of success. We note with much satisfaction that "arrangements will be made by which students in the biological course of the University will be required to pass at least one term in the station": workers will be thus assured, and we tender them our sincere congratulations and hearty good wishes for a prosperous development of their enterprise. It must not be forgotten that the Japanese waters have lately yielded us the interesting Chlamydoselache, and it would be a most interesting circumstance should the far-famed Hyalonema, to which Prof. Mitsukuri so frequently reverts in his article quoted, receive final consideration at the hands of his countrymen.

The following is a brief description of the station itself, extracted from the original article. "The building is of plain wood, and one story high, except in the middle part, which has a second floor. The main laboratory-room (A), which occupies the whole sea-front, is 48 feet long, 12 feet wide at the two ends, and 18 feet in the middle, and is able to accommodate about ten workers. A number of small aquaria for the use of investigators will be placed in this room. Of the rooms at the back of the main laboratory, one (B) has a cement floor and is for assorting and preserving specimens brought in from the sea. Another (E) is to be used as the library-room, and a third (C) as the store-room. The second floor over the central part of the building is able to give sleeping accommodation for a few persons. From a tank placed outside the building, fresh sea-water is carried into the main laboratory-room and the assorting-room, and is delivered out of many facets."

G. B. H.

THE AURORA IN SPITZBERGEN.[1]

THE best observations hitherto made on the aurora borealis are those made at Bossekop, by Bravais, during the expedition of the French corvette *Le Recherche*, 1838–40. Bossekop is also situated in the maximum zone of the auroras, on the coast of Northern Norway. Considering that Spitzbergen lies a little *north* of the same zone, and nearly on the same meridian as Bossekop, it was resolved that the observations of auroras should be made with the greatest possible care at the Swedish International Polar Station at Spitzbergen in 1882–83. This work was confided to Mr. Carlheim-Gyllenskiöld, and the auroral observations are the most complete that have been made by any of the international expeditions during that year. The results are now printed, and form a large quarto volume of 409 pages, with a great number of tables, illustrations, and figures. The results confirm and enlarge those of Bravais, and of other observers of this brilliant phenomenon.

(1) The first question is the determination of the mean co-ordinates of the auroral arch. A mean of 371 measurements gave the azimuth of the culminating point or summit of the auroral arch in S. 24° 12′ E. As early as 1834, Argelander, in Åbo, Finland, found that the azimuth of the culminating point of the auroral arch differs about 10° from the magnetic meridian. At Bossekop the magnetic declination was N. 10° 8′ W., and the declination of the culminating point of the auroral arch N. 22° 4′ W., the anomaly being, of course, about 11° W. The magnetic declination at Cape Thordsen was found to be N. 12° 45′ W., and of course the auroral anomaly from the magnetic meridian was 11° 27′ W.

(2) Eighty-seven measures on the position of the corona borealis were made, and the position of the centre of the corona was found nearly in the magnetic zenith, and *not* in the same vertical as the highest point of the arch. The means are:—

Position of the centre of the corona	H = 79° 55′ ...	Az. = S. 7° 12′ E.
Position of the magnetic zenith	H = 80 35 ...	Az. = S. 12 4 E.
Position of the culminating point of the arch	H = — ...	Az. = S. 24 12 E.

This confirms the measurements made during the past century by Wilcke, Mairan, and others.

(3) The breadth of the auroral arches varies with their elevation above the horizon. The arches consist of rays running in the direction of the breadth of the arch, and converging towards the magnetic zenith. Thus they form a long fringe of rays parallel to the dipping-needle, suspended, like a curtain, from east to west, but with a small extent of breadth from north to south. If this curtain of rays moves from the horizon to the zenith, the breadth varies according to the laws of perspective. The formula gives the greatest breadth at a height of 45°. In the neighbourhood of the zenith the arches are very narrow, stretching as a luminous band across the heavens.

(4) Besides the arches and rays, the auroral light sometimes formed a true spherical zone parallel with the earth's surface, thus floating in space as a horizontal layer of light, often crossed by several arches. This form is seldom to be seen in lower latitudes. These auroral zones were apparently much broader in the zenith than at their extremities nearer to the horizon. When such an auroral zone was lying wholly over the heavens, with the excep-

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[1] "Observations faites au Cap Thordsen, Spitzberg, par l'Expédition Suédoise." Tome II. (1) Aurores boréales. Par Carlheim-Gyllenskiöld.

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